

CLAIMS

We claim:

1. A molded semiconductor device package comprising:
 - a die attach pad;
 - a first and a second semiconductor die, each die having a die bond pad, each of the die positioned such that the die bond pads of each die face in opposite directions, the first and second die being connected to opposing surfaces of the die attach pad;
 - a contact lead positioned proximate to the first and second die;
 - a first bonding wire that is stitch bonded to the die bond pad of the first die;
 - a second bonding wire that is stitch bonded to the die bond pad of the second die;and
 - a molding cap that encapsulates the first and second die, the first and second bonding wire, and a portion of the contact lead, wherein the molding cap has a thickness of less than about 1 millimeter.
2. A molded semiconductor device package as recited in claim 1 further comprising:
 - a first conductive ball formation that is formed between the first bonding wire and the die bond pad of the first die; and
 - a second conductive ball formation that is formed between the second bonding wire and the die bond pad of the second die.
3. A molded semiconductor device package as recited in claim 1 wherein the first bonding wire is also ball bonded to the contact lead and the second bonding wire is also ball bonded to the contact lead.
4. A molded semiconductor device package as recited in claim 1 wherein the first bonding wire is also stitch bonded to the contact lead and the second bonding wire is also stitch bonded to the contact lead.

5. A molded semiconductor device package as recited in claim 1 wherein the first and second bonding wire are formed of a material selected from the group consisting of gold, copper and aluminum.
6. A molded semiconductor device package as recited in claim 1 wherein the package is either a thin small outline package or a quad flat pack package.
7. A molded semiconductor device package comprising:
 - a die attach pad;
 - a first and a second semiconductor die, each die having a die bond pad, each of the die positioned such that the die bond pads of each die face in opposite directions, the first and second die being connected to opposing surfaces of the die attach pad;
 - a contact lead positioned proximate to the first and second die;
 - a first bonding wire that is ball bonded to the contact lead and stitch bonded to the die bond pad of the first die;
 - a second bonding wire that is ball bonded to the contact lead and stitch bonded to the die bond pad of the second die; and
 - a molding cap that encapsulates the first and second die, the first and second bonding wire, and a portion of the contact lead.
8. A molded semiconductor device package as recited in claim 7 wherein the package is either a thin small outline package or a quad flat pack package.
9. A molded semiconductor device package as recited in claim 7 wherein the first and second bonding wire are formed of a material selected from the group consisting of gold, copper and aluminum.
10. A molded semiconductor device package as recited in claim 7 wherein the molding cap has a thickness of less than about 1 millimeter.
11. A molded semiconductor device package as recited in claim 7 wherein the first die contains integrated circuit components configured to form a memory or a logic unit.
12. A molded semiconductor device package comprising:
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a pair of semiconductor dice that are oriented such that a top surface of each die are facing in opposite directions, the top surface of each die having at least one die bond pad;

a conductive ball formation positioned on the die bond pad;

at least one contact lead positioned proximate to the pair of semiconductor dice;

at least one bonding wire that is ball bonded to the contact lead and stitch bonded to the conductive ball formation; and

a molding cap that encapsulates the pair of semiconductor dice, the conductive ball formation, the bonding wire and a portion of the contact lead.

13. A molded semiconductor device package as recited in claim 12 further comprising:

a die attach pad that is attached to and sandwiched between the pair of semiconductor dice.

14. A molded semiconductor device package as recited in claim 12 wherein the bonding wire is gold.

15. A molded semiconductor device package as recited in claim 12 wherein the molding cap has a thickness of less than about 1 millimeter in thickness.

16. A molded semiconductor device package comprising:

a die attach pad;

a first and a second semiconductor die, each die having a die bond pad, each of the die positioned such that the die bond pads of each die face in opposite directions, the first and second die being connected to opposing surfaces of the die attach pad;

a contact lead positioned proximate to the first and second die;

a first aluminum bonding wire that is stitch bonded to the contact lead and stitch bonded to the die bond pad of the first die, wherein the first aluminum bonding wire was stitch bonded to the contact lead before being stitch bonded to the die bond pad;

a second aluminum bonding wire that is stitch bonded to the contact lead and stitch bonded to the die bond pad of the second die, wherein the second aluminum bonding wire was stitch bonded to the contact lead before being stitch bonded to the die bond pad; and

a molding cap that encapsulates the first and second die, the first and second bonding wire, and a portion of the contact lead.

17. A molded semiconductor device package as recited in claim 16 wherein the package is either a thin small outline package or a quad flat pack package.

18. A molded semiconductor device package as recited in claim 16 wherein the molding cap has a thickness of less than about 1 millimeter.

19. A molded semiconductor device package as recited in claim 16 wherein the first die contains integrated circuit components configured to form a memory or a logic unit.

20. A method for forming electrical connections on a semiconductor device that includes a first and a second semiconductor die, each die having a die bond pad, each of the die positioned such that the die bond pads of each die face in opposite directions, and a contact lead positioned proximate to the first and second die, the method comprising:

(a) forming a first electrically conductive bump on the die bond pad of the first semiconductor die;

(b) ball bonding a free end of a first bonding wire to the contact lead, and then stitch bonding the opposite end of the first bonding wire to the first electrically conductive bump on the die bond pad of the first semiconductor die;

(c) forming a second electrically conductive bump on the die bond pad of the second semiconductor die; and

(d) ball bonding a free end of a second bonding wire to the contact lead, and then stitch bonding the opposite end of the second bonding wire to the second electrically conductive bump on the die bond pad of the second semiconductor die.

21. A method as recited in claim 20 further comprising:
encapsulating the first and second semiconductor die, the first and second bonding wires and a portion of the contact lead within a molding material.

22. A method as recited in claim 20 wherein the first and second bonding wires are formed of gold.

23. A method for forming electrical connections on a semiconductor device that includes a first and a second semiconductor die, each die having a die bond pad, each of the die positioned such that the die bond pads of each die face in opposite directions, and a contact lead positioned proximate to the first and second die, the method comprising:

(a) ball bonding a free end of a first bonding wire to the contact lead, and then stitch bonding the opposite end of the first bonding wire to the die bond pad of the first semiconductor die; and

(b) ball bonding a free end of a second bonding wire to the contact lead, and then stitch bonding the opposite end of the second bonding wire to the die bond pad of the second semiconductor die.

24. A method for forming electrical connections on a semiconductor device that includes a first and a second semiconductor die, each die having a die bond pad, each of the die positioned such that the die bond pads of each die face in opposite directions, and a contact lead positioned proximate to the first and second die, the method comprising:

(a) stitch bonding a free end of a first aluminum bonding wire to the contact lead, and then stitch bonding the opposite end of the first aluminum bonding wire to the die bond pad of the first semiconductor die; and

(b) stitch bonding a free end of a second aluminum bonding wire to the contact lead, and then stitch bonding the opposite end of the second aluminum bonding wire to the die bond pad of the second semiconductor die.

25. A method as recited in claim 24 further comprising:

encapsulating the first and second semiconductor die, the first and second bonding wires and a portion of the contact lead within a molding material.